REMARKS/ARGUMENTS

Claims 1-13 and 16-20 are pending in the application.

Claims 1, 2, 5, 8-13 and 16-19 stand as being Finally rejected with the rejection being based on 35 U.S.C. 112 second paragraph and on 35 U.S.C. 103(a) in view of the reference patents of White, U.S. 5,233,551 (herein White) in combination with the reference patent U.S. 5,963,164 of Tsui et al. (herein Tsui et al.). Claims 3, 4 and 6, 7 are noted as being allowable with correction of a 35 U.S.C. 112 paragraph 2 question. Claims 14 and 15 are also indicated as allowable if rewritten to include the contents of related independent and base claims. Claims 1-9 in the application are also rejected under 35 U.S.C. 112 second paragraph in view of a claim 1 ambiguity difficulty.

This status of each claim is established in the Office Action of Final Rejection dated December 20, 2007 and is understood to remain current through the later March 31,2008 Advisory Action even though not precisely recited in the Advisory Action. Applicants acknowledge an applicant initiated telephonic interview with Examiner Do on April 15, 2008 to verify this continuing same status of each application claim. Applicants' Proposed Amendment After Final Rejection dated 13 March 2008 is denied entry into the record in view of a determination of new issues being raised. The substance of this Proposed Amendment After Final Rejection is included in the present Request for Continued Examination document. The pending claims of the application are presented in the same form as that in applicants' previous response in view of the possible convenience of the change markings appearing therein.

Applicants thus herein amend each independent claim in the application to overcome the rejection under 35 U.S.C. 112 and to also to overcome the 35 U.S.C. 103(a) rejection. Applicants also present remarks of reasoning and argument based on extended inventor and attorney conversation and new appreciation of differences between applicants' invention and the invention of the White reference patent.

With respect to this White reference patent it now appears even more clear that the sole intention of the White invention is to realize a radix 12 (i.e., 12 point Fourier transformation) signal processing in a multiplication-minimized and even multiplication-eliminated, energy efficient manner--a manner combining two point Fourier transformations and six point Fourier transformations, this is indicated for example at White column 3, line 10; column 3, line 28; column 5, line 40 and column 4, line 65. In accomplishing this realization the White patent specification commences with a theoretical

and mathematical substantiation of the decomposition process used to achieve a multiplication reduced or multiplication-free Fourier transformation. This discussion identifies a relationship named a "twiddle factor".

Both the very name "twiddle factor" and applicants' early understanding of the invention disclosed in the White patent suggested the much discussed "twiddle factor" was something in the nature of an approximation used in achieving the White multiplication free signal processing or the White Fourier transformation and therefore bore some relationship with applicants' approximation invention. From the sequence of comments and evolving positions appearing in the examination record of the present application, applicants believe the present Examiner may well-have come to this same belief. Applicants are now convinced however that the several "twiddle factors" defined in the White document are not approximations but are mathematically precise correction factors used in order to simplify the White processing. Applicants are moreover also convinced that the only approximation present in the White invention is a somewhat trivial numeric value approximation. More explanation relating to these convictions appears in the following paragraphs.

If the Examiner can agree with this assessment of the White "twiddle factor" it would appear reasonable for the present exchange the end. In the following paragraphs applicants recite a plethora of specific references to the White specification in the hope that such references will be of help in reaching a mutual concurrence regarding the true relationship of the White document and applicants' invention. Applicants would of course welcome a persuasion that our presently prevailing apples vs oranges relationship between the two inventions is in error.

A notable part of the White signal processing thus involves the incorporation of signal phase adjustment processing circuits identified as "twiddle factor" elements. The White "twiddle factors" are formally identified as "phase–shifting complex-weighting coefficients" and are identified with the symbol W commencing at column 6, line 54 of the White specification. Generic mathematical definitions of a "twiddle factor" is disclosed at equation (1) in the column 6, line 56 White location and also at column 11, line 65; column 12, line 1; column 12, line 13 and in TABLE II at column 12, line 40. Mathematical expressions for two specific "twiddle factors" appear at column 7, line 47 and column 7, line 61. A block diagram description of White employed "twiddle factor" circuits commences at column 13, line 27. Five differing twiddle factor circuits are shown in the FIG. 9 through

FIG. 13 White drawings and usage of such circuits occurs at 20-28 in the FIG. 7 and FIG. 14 drawings.

Notably both the identified mathematical expressions and the several "twiddle factor" circuit embodiments in the White reference patent each involve some plural combination of simple addition, subtraction multiplication and division of real and imaginary signal components; i.e., signal processing that is mathematically precise in nature. In view of the contents of the several "twiddle factor" mathematical equations and the contents of the equation realizing circuits in FIG. 9 –FIG. 13 the White "twiddle factors" are clearly not of the initially believed approximated nature. Moreover these approximation-free "twiddle factors" are components of a Fourier transformation as shown at 20-28 in both the FIG. 7 and FIG. 14 White drawings but are not approximations nor are they productive of approximated Fourier transformation Kernel function locations as are recited in applicants' rejected claims. The description of t specific White signal processing commences at column 10, line 14 of the specification.

A topic of possible current relevance in the White processing concerns a recurring need encountered for a factor or signal identified as gamma (γ), a signal involving a mathematical square-root of three, $\sqrt{3}$, magnitude, see the signal identified as γ in the White FIGs. 7, 9, 11, 13 and 15 as well as column 4, line 20 and numerous other locations in the White specification. This $\sqrt{3}$ factor is used in plural locations when realizing the "twiddle factor" circuits as is explained commencing at column 12, line 13 of the White specification. See also the γ symbols included in Table I and Table II commencing at column 12, line 20 and text at column 12, line 30 in the White specification.. Use of the $\sqrt{3}$ factor in a Fourier transformation enables a simplification of the multiplication to be embodied in the Fourier transformation, column 12, line 30. In many White-described signal processing situations a digit shifting operation can be used in lieu of this multiplication so that a multiplication-free embodiment of the White Fourier transformation is enabled with use of the gamma factor as is explained at column 12, line 61 of the White specification.

A White Fourier transformation processor therefore may include a mathematical series based approximation realization of the $\sqrt{3}$ gamma factor as is shown in the White equation at column 12, line 66 and as is embodied in the FIG. 15 drawing. A description of the FIG. 15 circuit is located at column 13, line 5 of the specification; notably this gamma realization can be multiplication-free and of a shift and add nature. Notably this FIG. 15

mathematical series based approximation is achieved also using the mathematically precise steps of addition and subtraction of signals, signals involving a limited number (i.e., 6) of exponential powers of two between 2^1 and 2^{15}. (Also note the presence of the + and – signs applied at the input of adders 115, 117 and 119 in White FIG. 15.) Significantly the only approximation nature in this gamma signal realization or elsewhere in the White patent resides in the imperfect mathematical equality of a realization achieved with a finite six term mathematical series versus the actual magnitude of the desired $\sqrt{3}$ irrational number; i.e., 1.7320508---etc.--a magnitude that is an infinite number sequence in reality. Any embodiment of such a number is inherently an approximation to some degree however such an infinite number approximation does not teach the approximated Fourier transformation Kernel function as is disclosed in applicants' specification and recited in applicants' rejected claims.

The purpose of the approximated gamma related factor in the White invention is stated at column 12, lines 30-36; this purpose is for simplification and convenience, an enabling of embodying fewer multiplications in the White process. In fact with use of the gamma factor the White process can be embodied solely with shift operations as noted, column 13, line 2. Applicants respectfully submit that this White reduced multiplication prompted approximation is totally distinguished from the approximation of Fourier transformation Kernel function locations of the present invention.

The Examiner has referred to the White FIG. 5 drawings on multiple occasions in the course of the present exchange. On page 10 of the Final Rejection action it is for example asserted that this FIG. 5 drawing discloses Kernel function optimization with respect to radio receiver spurious response characteristics achieved. Applicants however find no recitation of either radio receiver, spurious response, approximation or optimization of Kernel function in connection with the White FIG. 5 drawings. These drawings are instead concerned with a defined new "w"-inclusive coordinate system, a skew–complex, non-orthogonal coordinate system as explained at column 9, line 2 and column 10, line 2 of White. As also described at column 5, line 17 the FIG. 5 drawings illustrate relationships between axes for the four different radix systems discussed in the White specification. None of this disclosure however teaches the approximated Fourier transformation Kernel function disclosed in applicants' specification and recited in applicants' rejected claims.

In applicants' invention moreover the magnitude of the Fourier transformation Kernel function is approximated with convenient Kernel function coefficient values many of which

lie in an annular arc but off of the Kernel function circle shown in applicants' FIG. 2, FIG. 3, FIG. 4 and FIG. 5 drawings. No such Kernel function locations are disclosed in the White reference. No annular arc disposition of Kernel function locations are shown in the White reference. Each of the White Kernel function circle inclusive drawings, FIG. 5 and FIG. 8, shows Kernel function locations lying precisely on the illustrated circle. This is significant. Significant because applicants' invention has approximated one factor in a Fourier transformation embodiment while the White invention has if anything approximated a totally different factor. Applicants have approximated what may be viewed as a geometric position of a Fourier transformation Kernel function while the White reference has approximated a numeric magnitude, a magnitude useful for "twiddle factor" simplification purposes but not itself a Fourier transformation Kernel function. Each of applicants' independent claims now in fact includes annular or different radii Kernel function radius descriptions expressly distinguishing over the single radius shown in the White reference.

Applicants invention has extended further to consider the number of approximated Kernel function locations employed in a Fourier transformation and the effect of Kernel function number and radial location and angular separation around the circle on such signal processing considerations as achieved radio receiver dynamic range and spurious response characteristics. These considerations are also totally absent in the White reference.

With respect to the rejected claims of the present application and the Office Action comments relating to these claims, each of applicants' rejected independent claims, claims 1, 10, 19 and 20 recites the approximated Fourier transformation realization including use of this recitation in plural claim locations. Applicants have discussed the present context improved meaning of such approximated Fourier transformations especially in the FIG. 3, FIG. 4 and FIG. 5 drawings and in the related specification text located in paragraphs [0051], [0054], [0055] through [0059] and [0062] for examples. Nothing identified in the White reference has however disclosed the use of approximated coordinate magnitudes and angle magnitudes in the real-imaginary plane representations of Kernel function realizations. Notably the "twiddle factor" in the White Kernel function is identified as a phase shift consideration not an approximation, and is a mathematically precise value rather than approximation value as is discussed above herein.

The Examiner appears however to have glossed over this express approximation recitation on numerous occasions during this exchange. Applicants' claim language has been reproduced in the Office Actions including this approximation recitation on multiple occasions without due consideration of the meaning of this limitation or realization that such arrangement is not present in the White reference. The White column 8, line 50-62 language relied upon repeatedly in the Office Actions is concerned with inter alia term definition and embodiments for a radix 2 Fourier transformation but does not disclose an approximation, especially not a Kernel function coefficient approximation. As described above the only possible approximation found in the White patent is concerned with the numeric value of a Fourier transformation simplification factor or convenience factor, i.e., the quantity gamma. This White approximation simply does not meet the approximation of Kernel function radius and angular position arrangements described in applicants' specification and recited in the rejected claims. In the Office Action the Examiner appears to expand the White reference beyond the bounds of its express disclosure in order to substantiate the rejection of applicants' claims.

With respect to the Examiner's Action reply concerning a 256 point Fourier transformation there yet appears no sound rejection of the detailed Fourier transformation numeric points range limitation recited in rejected claim 8 of the application. The White reference is as noted above focused on a 12 point Fourier transformation and the smaller point decomposition arrangements usable to realize this 12 point transform.

With respect to applicants' first reply page 10 argument concerning twiddle factor and square root of three considerations it appears the thrust of applicants' destruction of reference invention function if combined as asserted in the Office Action was misunderstood. Prior case law appears to accept the point that both intended and unintended consequences of an asserted reference combination merit consideration in determining the appropriateness of a 35 U.S.C. 103(a) combination of reference documents. In the case of the White and Tsui et al. references such unintended consequences appear undesirable as has been noted.

In the Advisory Action the Examiner has again referred to the White Figure 5 drawing with the assertion it shows an annular arc disposition of Kernel function locations. Applicants however find no indication in the White document that the Figure 5 drawing represents Fourier transformation Kernel functions. There appear to be but four recitations to a Figure 5 drawing in the entire White specification, these appear at column

5, line 17; column 9, line 5; column 9, line 18 and column 10, line 2. In each of these locations a Figure 5 drawing is indicated to show a coordinate system, i.e., skew complex coordinates that are non-orthogonal according to the column 9, line 4 recitation. The W variables illustrated in each Figure 5 drawing are also shown in the drawing to be "twiddle factors"; this relationship is repeated at column 7, lines 50 and 64 for example. At column 10, line 36 the "component of" relationship between such a "twiddle factor" and an actual Fourier transformation is discussed.

Applicants thus respectfully submit that the Figure 5 drawings are "twiddle factors" not the approximated Fourier transformation Kernel functions asserted by the Examiner and recited in applicants claims. Moreover it is clear that the Figure 5 "twiddle factors" are mathematically precise in nature and are not the approximations asserted by the Examiner. It is also clear that any displacement of points around the circles defined in the Figure 5 drawings are the results of differing coordinate systems, different but precise "twiddle factors" and different Radix numbers defined in Figure 5 rather than from the deliberate kernel function coordinate approximations recited in applicant's rejected claims.

In the Advisory Action the Examiner has also emphasized the present combination of the White and Tsui et al. reference patents. The Tsui et al. reference patent also concerns Fourier Transformation signal processing and the kernel function locations used in this processing. There is however a significant difference between the teachings of the relied-upon Tsui et al. reference and those of the present Tsui et al. application. These differences in fact appear of sufficient significance as to destroy the function of the present invention if the asserted combination of references were to be accomplished.

More precisely, there is strong negative teaching in the Tsui reference document regarding the location of Fourier transformation Kernel functions in off axis locations as is an express aspect of applicants' presently discussed invention. In fact there is a consideration of, then a rejection of, such off axis kernel function locations expressed in the Tsui reference. This teaching is found at column 4, line 47 through column 4, line 58 in the Tsui et al. '164 document where mechanization concerns are expressed. In view of this teaching the Tsui et al. '164 invention returns to a preference for on axis location of its Kernel functions, see the column 4, line 57 recitation in the Tsui et al reference patent. Applicants respectfully submit that this difference is sufficient to call into question the propriety of the Tsui et al. '164 document as a present reference.

In conclusion applicants again respectfully submit that the present invention rejections based on 35 U.S.C. 103(a) and the White and Tsui et al. references are less than well founded and are hence appropriate for reconsideration. Such reconsideration and allowance of the thusly rejected claims are respectfully solicited.

Respectfully submitted,

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